Menlo Park Notebook #143 [N-82-11-14]

This notebook covers the period November 1882-June 1883. The entries are by George Gibbs and Thomas P. Conant and relate primarily to chemical experiments. Included are notes and a few drawings concerning experiments to produce marks on paper, probably for an electric meter. There is also material pertaining to storage batteries, carbon filaments, cements for sockets, and mica insulation for dynamo brushes. The last half of the book is by Conant alone and relates to electric meter experiments. The book contains 284 numbered pages.

Blank pages not filmed: 1, 274-281.

Missing page numbers: 69-72.

Experiments with Oil of Anise. Nov. 14th /12. J.G.

Failed to obtain a solution in Oxalic Acid (either in the dry or cold) containing perceptible traces of the oil.

No solution with Salicylic Acid.

No solution with Boracic Acid

Obtained a solution with Sulphuric Acid and tried the following combinations with the results given below.

H_2SO_4 sol. alone — no mark.

+ KaCl — " "

" + $Co(NO_3)_2$ — " "

H_2SO_4 sol + Iodide of Ca " "

" Sesquichloride of Fe " "

" Cyanide of K " "

(over)

H_2SO_4 aq. + Acetate of Hg – no reaction
" " + Protochloride of Fe " "
above + $Co(NO_3)_2$
H_2SO_4 aq. + Carbonate of Mn " "
above + $NaCL$ " "
H_2SO_4 aq + $MnCL$ " "
above + $Co(NO_3)_2$ + $CuSO_4$ " "

Obtained a solution with Hydrochloric Acid, but could not get a reaction on the Reflector. The following compounds were tried:
HCl aq.
above + Bromide of Lanthanum
+ Chloride of Cobalt
NaCl + " " "
Sesquioxide of Lead.
Sesquichloride of Iron.
Chloride of Copper.

Nov 15/42 J. P. C.

Acetic acid Solution formed slowly in the cold easily upon application of heat. Current derived from Bunsen quart cells (bichromate) in series.

Solution alone gives fairly distinct mark up to 2500 ohms.

With addition of Salt gives same mark up to about 3000 ohms

With Salt and Chloride of Cobalt gives good black mark up to about 3000 ohms

With Chloride of Cobalt gives about same result not so distinct however.

With Chloride of Cobalt and Chlorate of Potash gives good black mark up to 25 00 ohms

With same plus salt. mark fairly black up to 2000 ohms

With Chlorate of Potash gives fairly distinct mark up to 25 00 ohms.

Same plus salt gives about same result.

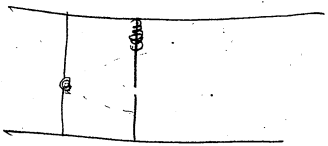
With Sulphate of Iron gives fair mark up to 2500 ohms.

Nitrite Bromide of Sodium
Faint mark to 2000 ohms

Red oxide of Lead gives
good mark up to 2000 ohms

Same plus salt gives
much darker mark up to
2000 ohms.

Tartrate of Soda – no result
Bisulphate " – " "
Hyposulphite " – " "
Sulphate of Potash – " "
Barytic " " – " "
Chromate " " – " "
~~Chromic oxide~~ – " "
Chloride of Mercury – " "
acetate " " – " "



Sulphate of Iron - no result
Citrate of Iron & Ammonia - " "
Chloride of Manganese - " "
Protochloride of Tin - " "
Phosphoric acid - " "
Cobalt Nitrate - " "
Lead nitrate - " "
Each of above + salt - " "

Carbonate of Copper gives black mark up to 2500 ohms and faint mark up to 15000 ohms

Some plus salt gives much clearer results up to some frequencies

Plus salt and Chloride of Cobalt gives better results (some resistance)

The marks obtained by use of the acetic solution become intensified by action of light and the shades of paper become somewhat yellow

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Chromic oxide - good result
" " + salt " "

Nov. 15th/12 George Gibbs

Obtained no results with a solution in Pyrogallic Acid,

Obtained a solution in Nitric Acid, with the following results:—

NHO_3 sol.	none
" " + Bichromate K	"
" " + Iodide K	Iodine mark
" " + Ferrocyanide K	none
" " Cyanide K	"
" " NaCl	"
" " + NaCl + Ferrocyanide K	"
" " " Cyanide K	"
" " + Potassium Chlorate	"
" " + Bisulphite Na	"
" " + Bromide Na	"
" " + Ammonium Oxalate	"
" " + $(NH_4)HS$	"
" " + $(NH_4)Cl$	"
" " + MgCl	"
" " + HgCl	"

(over)

Nitric acid Solutions (concluded)

HNO_3 Sol. + $PbSO_4$ none
" " + $(NH_4)_2Cu(SO_4)_2$ "
" " $CuSO_4$ "
" " $ZnSO_4$ "

Solutions in Tartaric Acid.

(Fritted). —

Solution alone gives faint mark up to 2000 ohms, but fades rapidly on exposure to light.

Solution and NaCl; — about the same as usual — faint — and worthless.

With Chloride of Cobalt — faint up to 2000 ohms. Green.

With $KClO_3$ gives good green mark up to 3000.

With Acetate Lead gives faint green mark up to 3000 ohms.

Tartaric acid solution cont.

Solution of ferrocyanide of K. gives faint green marks, but with little contrast, the paper being green itself.

Carbonate of copper gives green marks with whole resistance in (some 15 ohms).

Carbonate of lime and oxalate of ammonium gives same result.

Sulphate of copper — same result.

Sesquichloride of iron gives a very faint mark on dark colored paper.

Protochloride of tin gives no mark.

All of the above fade rapidly upon exposure to light.

Sulphuric Acid Solution:

The results obtained, with various combinations, through 15000 ohms.

Experiments with Tenebrionin
No results with aqueous sol.
when treated with various
compounds.

Experiments with Nitro-
-Benzol Nov 16/42 J. P. C

With acetic acid, no solution.

With sulphuric acid no solution

With Hydrochloric Acid no solution. —

Experiments with Dextrin
water + acid solution
gave no results whatever

Experiments with Anthracene.

For extraction the acids.

It was oxidized by a mixture of H_2SO_4 and Potassium bichromate, but made no mark.

For mark with the above + $NaCL$, or $KClO_3$ or $CoCL$.

Nov 17/82 J.P.C.

Paper soaked in starch and iodide of Potash gives good results which however are not permanent as the entire strip upon exposure becomes highly colored

The addition of a chloride prevents this but also has an injurious effect on the mark causing it to fade after a time

The best results are obtained by the addition of $KClO_3$

$NaCl$ - not permanent

KCl - " "

KNO_3 - good result

Iodide of soda - not permanent

Tried HCl & indigo, but could get no marks.

Acetate of Lead solution on paper gives dark marks, but is slow and of high resistance. Nitrate of Lead solution is much better giving a fine black mark up to 15000 ohms, but is slow.

Nitrate of lead and chloride of cobalt gives a faint mark of no practical use.

Acetate of lead + KI gives a mark which fades quickly.

$PbCl_2$ gives no marks, also litharge, PbI_2 or PbS_2.

Bichromate of potassium, – no result, also Barium salt with $CaCl_2$ or with $KClO_3$, or sesquichloride of iron.

Failed to get $CrCl_2$ on paper, or CrO.

No result with chlorides of cobalt.

Failed to obtain cobaltic oxide (Co_2O_3) (black) on paper by liberating Cl with mixtures of cobalt salts.

Fried cobalt salts ammonium
Sulphide with strong acid,
Chloride of Zinc and Sulphate of
Sodium is no good, also nitrate
of potassium.
Nitrate of Strontia, also flows
$KClO_3$ (no mark.) Also Per-
oxide of Lead. Acetate of
Mercury. Oxide of Cobalt
+ with $KClO_3$. (O) Sulphate
of potassium + with
Sulphide of iron.
Sulphide of lead in solution
with of ammonia.
Nov 20/4 - J. P. C.
Ferrous salt + KClO3 when
oxidized gives red mark but not
permanent - the action is not improved
by addition of other salts.

Acetate of Mercury and
sulphate of iron - no result.
Antimonic acid alone +
with NaCl - no result.

Potassium chloride of tin above
— with methyl — with Hydrogen
If potassium — three marks on
face blue paper

Sulphate of iron Nov. 21/82 J.P.L.
" " + $KClO_3$ — no result
" " + NaCl — " "
" " + Propionic acid " "

mixture of above " "

Nov 22/82 J.P.L.
Nitrate amyl — no result
" " + $FeSO_4$ " "
" " NaCl " "
" + NaCl + $KClO_3$ " "
" + " + " + $FeSO_4$ " "
+ Amyl alcohol "
" + " + $FeSO_4$ "
" + $CoCl_2$ "
" + " + Amyl alcohol

Nov. 22nd 1[illegible]

Ferrocyanides of Potassium & Sodium with $KClO_3$ gives quite good green marks on white paper, with 1500 times recrystallizations; permanent. This was the best green mark obtained with various modifications mentioned below. The following also gave green marks;—

Ferrocyanide of K + KCl
" " + NaCl
" " + KNO_3
" " + KNO_3 + $KClO_3$
" " Bromide [illegible]

Gave the following pale marks given:—

Ferrocyanide + KCl + NaHO (none)
" K_2SO_4 (")
" $CaCl_2$ (")
" + $KClO_3$ + Hyposulphite K (fader)
" $KClO_3$ + Chromate K (poor)
" $BaCl_2$ (")
" $CoCl_2$ [illegible]
" HNO_3 (blue paper)

Nov 22/02 J.P.C.

anthine Purple

H_2O solution + $CaCl_2$ - blue

" " + $NaHyPo$ - no change

" " + KNO_3 - " "

" " + NH_4NO_3 - " "

Black anthine - no results

Nov. 23rd 1882. — Page 43

Experiments with Aniline purple.
H_2O solution with NaCl — faint green marks on purple paper when small quantity of salt was used, but no result when enough NaCl was used to reach the solution.
Aniline sol. and ferrocyanide of potassium gives green marks on purple paper up to 1000 ohms; but is slow and not very pronounced.
Tried aniline solution with varying proportions of ferric chloride: this all ten samples — obtained ~~potash~~ with small proportion of chloride a pale green mark on purple paper. With large proportion of ferric chloride a dark green mark on green paper. All these marks fade after two or three hours exposure in sun.
Sulphate of Iron precipitates the colouring matter from the aniline solutions.

Nov 23 1/12 J. P. C.

H_2O sol blue Hbog - no result
" " + $KClO_3$ - " "
" " + " + NaCl - " "
" " + $NiNO_3$ - " "
" " + oil of anise - " "
" " + Propylic acid - faint

H_2O sol Brazil wood
alone + reducing current - blue
" + oxidizing " - white
+ NaCl - more sensitive
+ $KClO_3$ - " " but remarkable
+ KNO_3 " "
+ NaCl + $KClO_3$ " "
+ $K_4Fe(CN)_6$ - faint blue
+ $FeSO_4$ - no result
+ " + NaCl " "
+ Na_2CO_3 " "

H_2O sol Brazil wood

" + CaJ_2 — no result

acetate of Co — " "

" + " + $HC_2H_3O_2$ — " "

Decolorized with peroxide of lead and tried to restore by current — no result

H_2O sol + alum — no result

" " + $CuSO_4$ — " "

" " + " + NaCl — " "

" " + Cu acetate — " "

" " + Cu acetate + alum — " "

" " + ZnO — " "

Nov. 23rd/92 G. F.

Experiments with "Dye Wood".

Tried solution of dye-wood in H_2O alone and with ferric chloride – no result. –

I find that "dye-wood" gives faint reactions, not as marked as with "brazil-wood" but similar in color &c. ——

A solution of Cudbear I in H_2O when treated with NaCl and $KClO_3$ gives a fine pale yellow mark on red paper with lead, iron & faint platinum print, but the colors rapidly fade. ——

Tried Ext of Organum with acetic acid, nitric, hydrochloric and sulphuric, but failed to get a complete solution or the faintest marks with NaCl or $KClO_3$ or $CoCl_2$ &c. ——

~~Tried Carbonate of Iron in H_2O – no result.~~ —

Nov. 23rd 9.9. —

Tried a solution of copper sulphate and acetic acid then potassium carbonate; — no mark.

Also solution $CuSO_4$ and acetic acid + NaHO — no result.

Nov 24/82 J. P. C.

H_2O and Brazil Wood + acetate of Al — no result

Same + tartaric acid — " "

Naphthalin sol in H_2O + Alcohol no result

" " " " + NaCl. "

" " " " + $HCl\,O_3$. "

" " + NaCl + " — "

" + $KClO_3$ + $CaCl_2$ — "

" + Brazil Wood — "

Tried $CuSO_4$ with tartaric acid then $CaCO_3$ – no result.

Tried cupric ferrocyanide dissolved in potassic cyanide – no mark.

Tried black oxide of copper dissolved in HCl, or cupric chloride; stannic a black dot when point was held in potash for a moment (with no resistance ins.) It faded out almost immediately. –

Tried Hyperoxide of manganese in H_2O. I with reducing agent obtained a black mark, but found it very slow, as in the case of blk. oxide of Cu above.

Tried Acetate of manganese in H_2O – a faint mark obtained (n.g.) – Basic acetate of Mn + NaCl – faint and not sensitive.

Tried Carbonate of Mn in water – no result.

Nov. 24th/82. George Gibbs. 55

Fried Manganous Chloride in H_2O. gave a fine mark on white paper up to 2000 ohms resistance. Both the mark & color of paper are permanent. Fried above solution with NaCl with about the same result — also with $KClO_3$, the same. With Potassium nitrate — about the same — not more sensitive. With nitrate of ammonia — the same, with $(NH)_4NO_3$ + NaCl — no perceptible difference, best, dil. + $CiCl_2$ — no improvement.

Nov. 25th/82. — G. G.

Fried Bisulphate soda added to $MnCl_2$ solution — no mark. — Sulphate of potassium & $MnCl_2$ sol. — no mark.

$MnCl_2$ sol. + $(NH)_4SO_4$ — no mark.

Sol. with $CuSO_4$ — increased sensitiveness, getting a faint mark through

Nov 25 /92 ~~J. P. B.~~ J. J. 57

whole resistance, but paper turned green and mark disappeared after a while.

Tried Sol with Sulphate of Iron. got a good mark (with low resistance), but it faded immediately.

Tried Sol. with Sulphate of Zinc. Got a very good mark through whole resistance. Perfectly permanent & on white paper.

Nov 27/82 J. P. C.

Brazil wood sol in H_2O &
$HC_2H_3O_2$ – no result
same sol + $CaCl_2$ – " "

Tannate of Iron

Tartaric acid solution – 0
" " + NaCl – 0
" " + $NaHC_2H_3O_2$ – 0
" " NaCl + " – 0
" " + NaBr – 0
" " + " + NaCl – 0
" " + Bisulphite Na – 0
" " + Pyrogallic acid – 0
" " + " + NaCl – 0
" " + NaH_2PO_4 – 0
" " + KCNS – red color
" " + " + Pyrogallic acid – "
" " + NH_4NO_3 – 0
" " + acetate Al – 0
" " + MgCl – 0
" " + Potassium Sn – 0
" " + $Pb(NO_3)_2$ – 0

$Cu(C_2H_3O_2)_2 + NH_4Cl + Zn\,O$ = o

Tartric H_2O Sol alone – o

" " " + Na Cl – faint yellow

" " " + " + alumina acet – "

" " + alum + potassium tart o

" " + " + $Sn\,Cl_2$ o

Brazil wood H_2O Sol

" " + Ferri Tannic + $Sn\,Cl_2$

governed proper – blue streak, fading

Chloride of Platinum – o

" " + Na Cl – o

" " + " + $KClO_3$ – o

" " + Na Br – o

Nov 29 / 82 J. P. C.

$Mn(SO_4)$ & H_2O sol. sat. soon turns

" + H_2SO_4 - faint all

" + $ZnSO_4$ - " "

" + Disulph Na - 0

" + NaCl - soon turns

" + $KClO_3$ - 25 00 "

" + KNO_3 0

" + $Pb(NO_3)_2$ - 25 00

" + $PbSO_4$ - "

The mixture from the $Pb(NO_3)_2$ seems to turn darker with time that from the $PbSO_4$ not changing

Box 1 / 62 J. P. C.

$Mn(SO_4)_2 H_2O$ - salt sol
with $CuSO_4$ - 2500 ohms
" $Pb(NO_3)_2$ and
some $PbSO_4$ which forms
on the paper - 3000 ohms
point up to 10000 ohms.
+ $FeSO_4$ - no result
+ $BaSO_4$ (formed on paper)
up to 1500 ohms

Dec. 2nd, 1882. Geo. Gibbs. 67

Experiments with Cements:—
Saturated solution of chloride of magnesium; and magnesia (MgO).—

I find that one part by weight to one part by volume is about the maximum quantity that will be absorbed. This forms a thick paste, and will set and become very hard in 12 hours. A less number of parts by weight may be used, but will require longer time in setting.

This cement will harden with from 15 to 20 times its own weight of [illegible]

Experiments on strength of battery

Two platinum Cu in H_2SO_4 sol of J

also two Cu cylinders in porous cups containing J sol in Na_2CO_3 – cups hung in glass vessel containing Na_2CO_3 sol

Dec 4 J. P. C.

Made up sol of
acetate aniline + NaCl +
$KClO_3$
also
$MnSO_4$ for test
of proper in printer

Experiments on cements

Sat sol $CaCl_2$ + hydrated lime
made best splints and also cortick wires

Sat sol $ZnCl_2$ + ZnO
as above

The difficulty is with them that they crack off when dry

Dec 8 J. P. C

Took the following solutions (cold) and placed wires in them

$NaOH$ – no coating

NaH_2PO_4 – " "

$NaBr$ – " "

$Co(NO_3)_2$ – coating (not insulating)

Hg acetate – no coating

NH_4Cl – " "

arsenious acid – coating (not insulating)

I – " "

$K_4Fe(CN)_6$ " "

KCN – " "

$MgCl_2$ – coating partly insulating

$CaCl_2$ – " "

Dec 9 J. P. C

The previous tests repeated but with about same results

Tried to obtain coating by electrolysis using same solutions

The trouble is that the coatings crack off on drying

The best result is from the $CaCl_2$ sat sol which forms caustic hydrate of lime giving a good insulation which however will peel off on drying

(The $Ca(OH)_2$ forms on the cathode)

Lec 11 - J. P. C & G. P.

Used insulators
This insulator melt and
is elastic
Field Chronicle of Electricity
- not good - [illegible] -

The water glass does not
stand a red heat and
would not fuse on
the wire but instead
swelled and cracked
off owing to burning of
the Na.

Box 12 J. P. C 400

Wire insulated by silk was soaked in tungstate of soda the object being to render said insulation fire proof. The result was unsatisfactory as the coating became charred and rubbed off.

Tried asbestos paint but could not dry it on the wire

In attempting to dry by heat the oil would burn out leaving a coating of asbestos which although a good insulator, cracked off easily

Dec 12th/12 G.G.

Fired the following glazes:—

1) Flint-Glass 10 lbs.
White Arsenic 1 "
Nitre 1 "

2) Red Lead 1 "
Flint-Glass 3 "

3) Red Lead 4 "
Calcined Borax 1 ½ "
Flint-Powder 2
Flint-Glass 6.

These were fused and then powdered. A paste was made of the powder and the ware coated with them.

It did not succeed well, as the paste rubbed off, and yellow ochre was added, but as the fire the paste, the tinge was taken out.

Dec 13 J. P. C.

Chromate of K gave by electrolysis a coating on the wire which did not insulate.

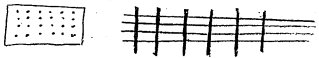
$(NH_4)_2SO_4$ = same result.

KNO_3 = no result

oxalate of K = good insulation wire a less elastic but not capable of withstanding a red heat

Dec 17th G.G. —

Fried mica insulation for brush-es as follows: —



A number of holes were punch-ed in mica plates, and wires comprising brush pushed through them as shown. —

Dec 15 18L J. P. C

cemented plates of
Mica with $MgCl_2$
+ MgO

Dec 19 / 8 L J. P.

Made lamp-solution of Mg Cl_2 sat sol + Mg O (good)

Dec 20 / 8 L 3. P.C

Made up following cements.

1 = 15 c.c. sat sol $MgCl_2$
1 gm MgO
10 " chalk fine

2 = 15 c.c. sat sol $MgCl_2$
1 gm MgO
15 " fire clay (gritty)

3 = 5. c.c. sat sol $MgCl_2$
1 gm MgO
17 " feldspar
good but slow

Dec 20 (continued) / 8L

J. P. C

4 5 c.c. sat sol $MgCl_2$
1 gm MgO
10 " Pon. Kaolin

5 5 c.c. sat sol $MgCl_2$
1 gm MgO
10 " Stom

Stom - bain

6 5 c.c. sat sol $MgCl_2$
5 " Glue H_2O
10 gm MgO

Cook

Dec 21 /82

J. P. C

7 5 c.c. sat sol $MgCl_2$
2 gm MgO
10 " chalk
fair

8 5 c.c sat sol $MgCl_2$
2 gm MgO
15 " clay
good

9 5 c.c sat sol $MgCl_2$
2 gm MgO
slow gout

Made Comp. socket
20 c.c – sat sol $MgCl_2$
10 gm MgO.
good

Dec 21 ~~oct~~ / 12

J. P. C.

1/ 10 c.c. sat sol $MgCl_2$
10 gm (good result) MgO

2/ 10 c.c. sol ($\frac{1}{5}$ H_2O) $MgCl_2$
10 gm (good result) MgO

3/ 10 c.c sol ($\frac{1}{20}$ H_2O) $MgCl_2$
10 gm (good) MgO.

4/ 10 c.c sol ($\frac{1}{3}$ H_2O) $MgCl_2$
10 gm (fair) MgO

Dec 21 cont. Ad L J. P. L

5/ 10 c.c sol ($\frac{1}{2}H_2O$) $MgCl_2$
10 gm (bain) MgO

6/ 10 c.c sol ($\frac{3}{4}H_2O$) $MgCl_2$
10 gm (no good) MgO

7. 10 c.c H_2O
10 gm (no good) MgO

Dec. 22 /82 J. P.

5 c.c. sat sol $HgCl_2$

3 gm HgO

7 " Iodoform

good. slow

5 c.c. sat sol $HgCl_2$

5 gm HgO

1 c.c. Collodion

bad.

5 c.c. sat sol $HgCl_2$

5 gm HgO

2 c.c. Linseed oil

bad

Dec 22 cont'd/82 J. P.

5 c.c. sat sol. $MgCl_2$
2 gm MgO
5 " Phosphate fine
good

Tried to form a cement with mixture of slaked lime. This was a failure as the lime would not mix in but made the cement very granular.

5 c.c. sat sol. $MgCl_2$
2 gm MgO
11 " Feldspar
good

Dec. 20/82 J. P. C.

5 c.c sat sol Mg Cl_2
4 gm Mg O
5 " Silom
good

Lamp socket
20 c.c Mg Cl_2
20 gm Mg O
(good)

Dec. 26 /82.

J. P. C.

cement of $MgCl_2$ + MgO + gluten (rough experiment) N. G.

Made experiment of depositing carbon upon carbon filament in kerosene oil, by means of spark from arc carbon and by heating to incandescence

Dec 27/92

J. P. C

Lamp socket

30 c.c. – $MgCl_2$ ($\frac{1}{2}$ H_2O)

10 gm – MgO

6 " Burnt alum

N. G.

Jan 2 / 83

J. P. C

Plug

30 c.c. sol $MgCl_2(\frac{1}{6}H_2O)$

& gm MgO

5 " Silica

~~Iron not found~~

Cement

$MgCl(\frac{1}{6}H_2O) + MgO$

+ $CaCl_2$

to test drying properties

of the chloride.

N. G

Jan 2 1/03

J. P. C

cement

10 c.c. $MgCl_2(\frac{1}{2} H_2O)$

5 gm MgO

15-20 " $BaCl_2$

set rapidly but

remained wet on the

surface

Note. This cement after

standing for several

weeks went all to

pieces.

Jan 3 / 89

J. P. C

Cement

10 c.c. sat sol. $HgCl_2$

5 gm HNO_3

14 " soapstone

F (a little soft)

Jan 4/03 J. H. C.

10 c.c. Sat sol $MgCl_2$

7 gm MgO

14 " Scopolamine

F good

Jan 5

10 c.c. Sat sol $MgCl_2$

15 gm MgO

20 " Scopolamine

X good

Jan 6

10 c.c. Sat sol $MgCl_2$

5 gm MgO

22 gm Scopolamine

good

10 c.c.
10 grams oxide mag

Jan 4 /03

J. P. C.

10 c.c. Sat sol $MgCl_2$
9 gm MgO
8 " Soapstone

(Very good)

10 c.c. Sat sol $MgCl_2$
10 gm MgO
15 " Soapstone
15 " (Good) Feldspar

10 c.c. Sat sol $MgCl_2$
5 gm MgO
5 " Soapstone
5 " (Poor) Kaolin

Jan 4 / 03

3, P.

10 c.c. Sat sol Mg Cl2

6 gm Mg. O

5 " soapstone

5 " Feldspar

5 " Kaolin

Jan A

Jan 5/13

J. P.

10 c.c. conc sol $MgCl_2$

5 gm MgO

10 " $CaCO_3$

good show

Jan 6/43

J. P. C

Sorbet

20 C.C sort sol Mg Cl

14 gm Mg O

14 " Sorbitol

very good Sorption

Jan 8 / 85.

J. P. C

15 c.c. sat sol $MgCl_2$

7 gm MgO

11 " soapstone

P slow

15 c.c. sat sol $MgCl_2$

5 gm MgO

20 " soapstone

//// slow

15 c.c. sat. sol $MgCl_2$

5 gm MgO

22 " soapstone

V slow

June 9 / 83 J. P. C

20 c.c. sat sol $MgCl_2$
1 gms MgO
14 " soapstone
⊙ (good)

20 c.c. sat sol $MgCl_2$
5 gms MgO
20 " soapstone
(good)

10 c.c. sat sol $MgCl_2$
3 gms MgO
20 "
10 " soapstone
feldspar
(good)

Jan 9/83

3, P. 6

10 c.c. sol ($\frac{1}{3}H_2O$) $MgCl_2$
5 gms MgO
20 " soapstone
(slow)

Socket-

20 c.c. sat'd sol $MgCl_2$
10 gm MgO
20 " $CaCO_3$
5 " soapstone
(good)

---

10 c.c. sat'd sol $MgCl_2$
2 gms MgO
12 " Plastic Paris
slow gritty

Jan 10 / 82 J. P. C

10 c.c. sat sol $MgCl_2$
5 gm MgO
1½ " Phosph Pers
/ fair

---

10 c.c. ~~sat~~ 1.C (½ H_2O) $MgCl_2$
5 gm MgO
15 " Phosph Pers
fair

Phosphate
25 c.c. sat ½ H_2O $MgCl_2$
10 gm MgO
" fair Phosph Pers

Jan 31 / 83

taken	result
20 c.c. conc H_2SO_4	partial
" + 1 c.c. H_2O	"
" + 2 " "	"
" + 3 " "	"
" + 6 " "	"
" + 7	good (very)
" + 9 "	partial
" + 12 "	[illegible]
" + 4 "	good
" + 5 "	"
20 c.c. H_2SO_4 to (4 to 7)	c.c. H_2O
is best	

Note. above was a trial on purchmüttiging

J. P. Lorant

Feb 24 1910

Experiment to prevent oxidation of Zinc water galvanis.

Standard sol.

3½ Grams $ZnSO_4$ to 35 litres dist H_2O

Tried the following

Standard sol + 2 % glycerin

" " + 5 " "

" " + 15 " "

" " Boiled

" " + Zn amalgam

J. P. Conant

Feb 26 /13.

ppt + NH_4OH and redissolved ppt in "

added $HC_2H_3O_2$ till slightly acid

Crystal of alum

200 c.c standard sol + 1 gm dextrine

" " " + 2 " "

" " " + 4 " "

" " " + 1 gm of Pyrogallic acid

Tried also alkaline sol of pyrogallic but always found a precipitation adding to solution

— J. P. Cornell

Feb 27 /80

2 oz c.c. stan. sol. + 1 gm sugar
" " " + 4 " "
" " " + 10 " "

Placed copper turnings in bottom of jar also pure tin.

Fe SO_4

Boiled and covered with ℔ olive oil ½.
Turpentine, ½ castor oil
¼ cubeb oil

Plated Zn on anod Zn and then removed. Ttn

plate was then suspended in sol

Isopropanol

alcohol

Benzyl mood sol

sugar alcohol

sulphuric ether

sulphate ethophrine

J. P. Conant

Feb 28 1873

Sol boiled and covered with collodion

Jerman silver turnings placed in sol

Made communication of this event

for Mr Porter

J. P. Barnard

Mon 1 /83

Sol. boiled and covered
with oil of organum
Turmeric sol added
Naphtholin "
Chloral Hydrate "

J. P. Corsant

Mon 2 / 8 J

Placed in sol a large plate = 4 times surface of smaller

$PtCl_2$

CS_2

$H_2K_2Sb_2O_7$

Spongy lead placed in bottle (not in contact)

~~Sour spoch~~

also antimony

Mr 2 /83 (continued)

Bed bolted and covered with oil arranged

also with oil ferrungpro

J. P. Conant

Mar 3 / 93

Experiment to determine loss of weight of plate due to action of

a. alum.

wt of plate = 42.419 grs
" " alum = 0.7625 "

300 c.c. standard sol

b. acetic acid

wt of plate = 95.6651 grs
acet acid - 3 c.c
300 c.c. stan. sol

Sol boiled and covered with cut white thyme

NH_4Cl added

Mrs 1/6 continued

added Creosote

Sol. boiled & covered with
oil of Tansy

added Na Cl

J. P. Conant

Mar 5/83

Experiment to obtain a glass from antistamus based from alkali

Lithargé — no good

J. P.

(over)

Mar 6 /93

Sulphate Lead + SiO_2
works fairly

Silico fluoride Barium
alone + + SiO_2 - good

Sulphate of Lead alone
+ + SiO_2 - works well
but requires a high temp

Carbonate of Lead
works very well and
fuses in bunsen flame

Mon 4 /83

Metric experiment

ord prost acid + acetic acid

wt of plate = 45,694 grms.

Iso c.c. atom ord

wt of plate - 42.478 grms

alum - 2 grms

Phosphoric acid

KCy = precipitates

oxalic acid "

J. P. Cornish

Mar 10 / 13

Experiment having for its object the coating of a carbon with lime

The following solutions were tried the electrodes being thin rods of carbon.

calcic hydrate
" anhydride
" carbonate
" acetate
" chloride +
" sulphate
" succinate
" oxalate (in HCl)

J. P. Cornish

Mar 12 / 89

(Mitis) wt of Plate = 45.6962 5 gms

Solution rendered strongly acid by acetic acid

For coating carbon.

Magnesium chloride – 0

" Nitrate – 0

" Sulphate – 0

" acetate – 0

" Citrate – 0

" Calcium of Strontium Sol 0

Carbolic acid in Melin

Tartaric acid "

Citric acid "

Mar 12 /93 continued 73
(Melter)

Borax = 1 pt.

added Na_2SO_4

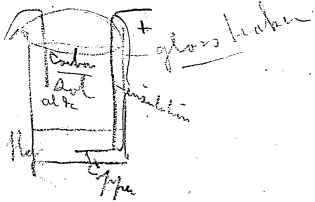
" Chromic acid

" $ZnCl_2$ very little

Thomas P. Grant

Mar 13 /13

Tin plating carbon;
sol of aluminum sulphate
+ NaCl -



also same with no
NaCl

also al sulph with
two carbon electrodes

Mar 13 / 40 Continued

acetate of aluminum
chloride " "
oxalate " berium in HNO_3

---

boated inside part (clamp wires &c) with thick solution of gum tragacanth

---

Made strongly saturated solution of $ZnSO_4$ to see if plates would oxidize in this

---

J. P. Barrett

Mar 14, 1893

Determination of H_2O in $ZnSO_4$

wt crux = 3.330 grs

" " + $ZnSO_4$ = 5.633 "

" + D = 5.190 "

5.633	5.190	4.908	2.003
3.330	3.330	3.330	1.478
2.303	1.860	1.578	.821

wt + 2D = 4.908

wt + 3D = 4.915 N. G.

.821 × 100 / 2.303 = 35.6 % H_2O

1.9091
13410
11515

J. P. C.

Mar 14,

Plate from alum sol'n

Mar wt = 42.4740 gms
wt = 42.4645 gms
.0095 gms

loss = 13 mgs in 6 days
from 2 gms alum

013 | 182478

13.000000 | 182478
42478 .00015
475220
412390
62830 .015%

13.500000 | 182478
42478 11 .00063
52520
49484
3036
2477 J. R. Cormont

.0063%

Mar 15 /43

covered clamps & mass of inside part with bolbodium and carbonized in linseed oil (cV.g)

carbonized coating of bryoconith prepared on the 13th as above

covered clamps &c with their leaf bryoconith, the leaf being moistened and ironed on

considerable quantity of gum is required as it contracts very much on drying and heating

(over)

Mar. 15 /80

wt of Plate = 77.9435 grs
" " NH_4Cl = 0.5000 "
300 c.c. sol

wt of Plate = 77.672 grs
" " Na_2SO_4 = 0.5000 "
300 c.c. sol

Plated aluminum on Carbon from oil sulph

J. P. Cornish

.7625 : 1 :: 6,456 : x

6,456 cm / .7625
610.00 "
8.45 +
35600
30500
5100 0

Mar 14 / 83

Plate from album rel of
Mar 3.
rel Mar 3 = 92.419 gs
" " 15 = 92.405
.014 gs

.014 / 13
13 .001096
39 6
90.00 6456

Ives in 6 days = 6.5 mgs
" " " " = 13.5 "

rel mass
.7625 gs
2.00 "

2 / 13.5
6.75

.7625 : 1 :: 6.75 : x
2.00 / .7625

J. P. Cornell

Mar 17 /80

Plates for Meter prepared as follows.

unamalgamated but and unwashed in KoH but scraped bright (turned yet black in 15 minutes)

amalgamated without acid being washed in KoH and then in H_2O (poor result)

amalgamated by sol of sulphate - nitrate & chloride of Hg (washed in KoH & H_2O) (poor result)

amalgated with acid but washed with H_2O between dips and also after anod. (cleaned + KoH (minimum)

Nov 17/89 Continued

amalgamated with acid and washed after amalgamation. (Gum)

amalgamated with acid and not washed at all (Gum)

Tried to carbonize tragacanth in $ZnCl_2$ but the carbon and gum were simply eaten.

J. P. Garrett

Mar 19 /93.

wt of Photo = 44.634 gms +

Na_2SO_4 = 0.2500 "

stan. soln – 300 c.c

wt of Photo = 43.649 gms 0

Na_2SO_4 = 1.000

stan. soln 300 c.c

wt of Photo from Mar 8

w(14) 42.4645 gms

wt(19) = 42.434

0.0305 loss in 5 days

.0135 " " 6 days

.0275 " " 11 "

Loss = 44 Mgs in 11 days

(over)

Mar 19 / 83.

wt of Plate = 45.3375 grms

NH_4Cl = 1.000

Sham. Bath = 300 c.c

Plate from acetic Mar 3,

Mar 3 = 45.6655 grms

" 19 = 45.3790 "

.2865

Loss = 286.5 Mgrm in 16 days

286.5 gm 16

126 / 112 / 145 / 140 / 10

16 / 1790 / 1600 / 190 / 160 / 30

(over)

Mar 19 /83.

wt of Plate = 44.375 grs

Na Cl = 1.000 "

Alum sol = 300 c.c.

wt of Plate = 85.6315 grs 2

Na Cl = 0.500 "

Alum sol = 300 c.c

The action of the alum sol. seems more energetic when only a small quantity of alum is used, at first; but the strong solution seems to have its action intensified by time

(over)

Mar 19/83

wt of Plate = $0.744 grs

citrate Caffeine – 0.200

stan sol. 300 c.c

Narcotin grave pptt.

Nitrate Strychnine = 0.200 grs

wt of Plate = 76.7435

stan sol 300 c.c

Veratrin grave pptt.

Weight of Plate = 78.004 grs

Stan sol. – 300 c.c

To see if the solution attacks the plate

Prepared subgallicate of ammonia by long in water

J. P. Conant.

Mar 20 /13

wt of Phola = 12,077 gms

Citrate Caffein = 0.005 "

Stam sol. = 200 c.c

J. P. Conant

Mar 21 /93

Prepared sodiopalatid Potassium for use in Water but it was of no use as it pptd. Zn.

J. P. Conant

Mon 22 / 8 / 9

Tried to plate aluminium on brass using solution of sulphite of at and alum. result was only partially good

Same in alkaline sol and also alum alone gave no result.

Prepared solution as follows

at sulph	= 20 gms
alum	= 10 gms.
Water	= 500 c.c.

J. P. Conant

Mar 23 /83

wtd. Platinum 15.15 - 3 grs

Palladium — trace

Sol 300 c.c

Made experiment of plating at one time

(not very good result)

J. P. Cooke

1,1355000 | 11.9925
1114000 | .815
21500
19925
75750
69625

~~1,1355000 | 1,3925~~
~~1114000~~ | ~~.814~~
~~19500~~
~~13925~~
~~55750~~
~~55700~~
~~.82~~
~~.82~~

Mar 24 / 8/3

Ergotin (alcoholic ext.)
Mfr Zn and is N.G. for
the market

Mfg of alcohol.

wt in air = 11.6425
" " H_2O = 10.2500
" " EtHO = 10.499

11.6425
10.2500
1.3925 wt H_2O

11.6425
10.499
1.1535 wt EtHO

Mar 24 /85 (Continued)

Plate from NH_4Cl of Mar 19 has lost nothing in weight

J. P. Cornish

Mar 26 /83

wt of $HgCl_2$ = 1 grm.

" of annal lead plate = 64.1855 grs

distilled H_2O = 300 c.c.

The object of the above experiment is to determine whether or not a plate of lead amalgamated will either reduce mercury from or be oxidized by a solution of a salt of mercury, the aim being to obtain some metal which may be amalgamated, but which shall

(over)

Mar 24/93

be reacted on by a solution of mercury or a salt of mercury, and also be reacted on by the acid radical set free by the decomposition of such salt – The plate in question to be used as a carrier of mercury in a meter in which the quantity of current shall be measured by the quantity of mercury removed from the one electrode or deposited on the other.

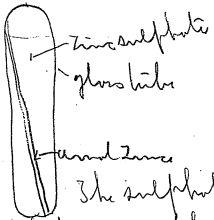
J. P. Cornett

J. F. Otto

The hot solution caused the mercury to crack up destroying the smooth surface.

Mar 26, 1890

Prepared the following experiment



The sulphate and plate were placed in the tube. The solution was then boiled and the tube sealed the object being to see if the plate would oxidize under these circumstances.

J. P. Conant

April - 19 - 83.

Plate from Na_2SO_4 Sol of

Mar 15.

wt Mar 15 = 77.8825

" Apr 19 = 77.7442

gain .0783

wt of Plate + from Na_2SO_4

of Mar 19 = 84.634

wt Apr " = 84.710

gain .076

Plate O from Na_2CO_3 of

Mar 19 — 83.649

Apr 19 — 83.714

gain .065

J. M. Crowell

April 20 – 1883.

Plate in Nacl + of Mar 19

wt Mar 19 = 84.875

" apr 20 = 84.420

gain = .045

Plate Nacl 2 Mar 19

wt (19) = 45.6315

" apr 20 = 45.6820

gain .0505

Plate from citrate calcium

of Mar 19 = 40.744

wt apr 20 = 40.790

gain .046

Apr 20 – 1873

Plate from strychnine Nitrate

of Mar 19 = 46.7435

nit apr 20 = 46.8835

gain .1420

Plate from strom sol of

Mar 19 = 78.004

Apr 20 = 78.073

gain .069

Plate from citrate cafeine

of Mar 20 = 42.077

nit apr 20 = 42.136

gain .059

apr 20 1883

Plants from Potassium of

Mar 20 = 85.153

apr 20 = 85.204

gain .051

Amorphous Seed

Mar 20 wt = 64.1651

apr 20 " = 64.1645

loss .0006

Resume of Water Experiment

Boiling the solution and covering with oil does not help matters in the least as in all cases tried there seems to be a reaction between the oil and the solution, the result of which is a deposit upon the plate.

This has been tried with the following oils.

olive oil	white Sesame oil
Castor "	Tamay "
Carbolic "	Imperatine
Lemongrass "	Solution also
Wormseed "	covered with
organum "	collodion which
	dried and cracked

The placing in the bottle of other metals with a view to throwing the oxidation on to them resulted in failure, for the metal was either unaffected upon or else taken up by the solution and reduced on the plate.

---

acetic – tartaric – citric and phosphoric acids keep the plate bright but act upon it too strongly when present in sufficient quantity to be of service

---

Chromic acid is reduced by the Zinc

Of all the other substances tried the only ones that promise fair at all are ~~[illegible]~~ SO_2, NH_3Cl, $NaCl$ – Na_2SO_4 –

Chloride of calcium – Pyrenes, which seem to keep down the oxidation somewhat without attacking the plate.

It was hoped that among those substances ~~which~~ which kept the plate bright, some might be found whose action would be constant but thus far all seem to be weakening, the action being strengthened

The experiment of using different methods of amalgamation showed no particular result.

The best result so far as keeping the plate bright goes, is that obtained by boiling the solution containing the plate and sealing the vessel at once.

The plate of amalgam found in $HgCl_2$ lost but a small fraction of its weight but as it seems to be covered with

reduced mercury it would appear that the reduction has taken place at the expense of the lead plate although ordinary tests do not show the presence of lead in the solution.

Thomas P. Bennett,

June 9 – 1893.

Experiment on the weighing of fine metal plates, the object being to devise a balance whose action shall be extremely rapid and which shall at the same time weigh within a few say 5 to 10 mgs. of the correct weight

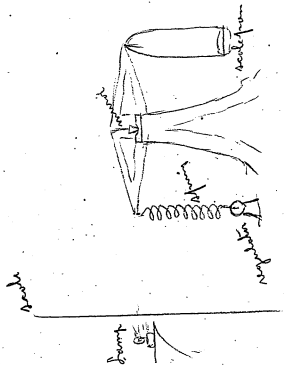
On Monday June 4 – 93 and through the week the following experiments have been performed:

The first idea was to use instead of weights, the tension of a spring and to read the deflection of the scale beam by means of a reflected spot of light

June 9 - cont.

upon a scale placed at any convenient distance.

The apparatus was put together as per sketch below.



June 9 cont.

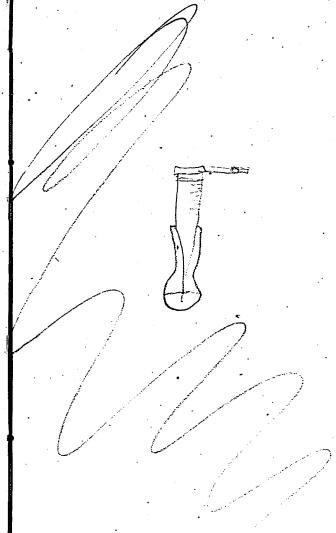
The following springs of brass were tried.

No. 1 =
Diam of wire = .030"
" " spring = $\frac{3}{4}$"
Length " " = 2"

No. 2 = same as above with length = $2\frac{1}{2}$"

No. 3 = ~~.054~~"
Diam of wire = .059"
" " spring = $\frac{15}{16}$"
Length " " = 5"

No. 4 - same as 3 with length = $6\frac{1}{2}$"



June 9 – cont'd.

N = 5

Diam of wire = .030"

" " spring = $2\frac{1}{2}$"

Length " " = 6"

The trouble with all of these is that if a spring is sensitive enough to indicate a small weight say 10 mgs. a weight of 40 gms on a 25 light plate, will pull it nearly straight while on the other hand if the spring will sustain a heavy weight, the light weight will not affect it.

The size of the spring seemed to make very slight different and the only

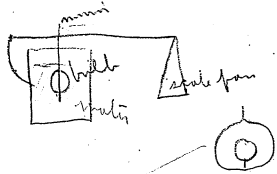
way to magnify the deflection would appear to be by increasing the distance from the scale to the mirror.

After this process long time fact, it is difficult from the weighing chair to see the scale.

With regard to weighing by the hydrometer, the same trouble occurs, that of the ~~bad~~ hydrometer will show the effect of a light weight, a heavy one will push it out of sight.

Juice 9. cont.

The apparatus would have been as follows.



showing mode of connecting bulb to lever.

The reason for getting under the bulb is that it is hard to guide it in any other way with out an excessive amount of friction.

The idea would be to have the bulb closely balance the

from 9 - cont

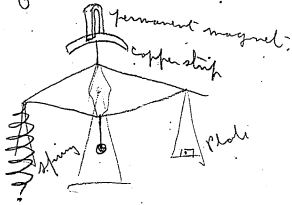
average weight of the plate and then ~~add~~ read from the scale by reflected light, the excess or deficiency with reference to the standard

~~The difficulty with~~ this, by calculation may be proved to be ~~that~~ already mentioned as it would not be easy to ~~so also calculate the average weight as to avoid~~ obtain a set of plates which after use would not show wide differences

Thomas P. Lamont,

June 12 - 93.

Experiment to reduce oscillations of balance beam.



The magnet used was strong enough to lift a half pound piece of iron.

The effect was nothing and the balance shook as badly as ever

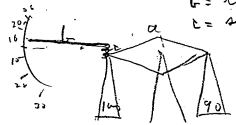
J. P. L.

Began the construction of a balance on following principle. The weight to be suspended by a spring and the lever raised by hand there being an arrangement by which as soon as the scale pan leaves its support, the movement of the lever is arrested by an electro magnet.

June 14 – 93 —

Having noted the difficulty of using a spring between such wide limits as from 10 mgs. to say 100 gms = 1 to 10,000, it was determined to try the idea of training only a portion of the weight upon the spring. In other words, to roughly balance the plate by weights and obtain the fine reading by the spring.

a = beam
b = lever
c = spring



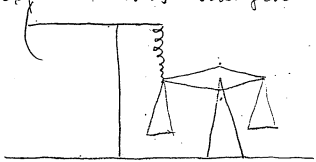
Thus in the preceding sketch, only the difference in weight will come upon the spring.

The experiment was tried and 10 mgs gave a readable deflection, the plate being balanced by weights to within 1 or 2 gms.

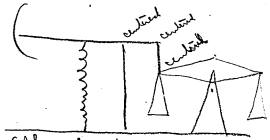
The experiment was repeated, using instead of a spring, a rigid connection between the beam and lever and if the plate be balanced to within 1 gm, the deflection indicate correctly the difference

June 14-83 - cont

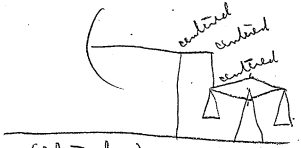
The following sketches show the various methods in which the experiment was arranged



unsteady



(steady)



(Steady)

A counterpoise was added to the ~~lever~~ to balance the bridge between it and the beam.

Thomas P. Lonnart.

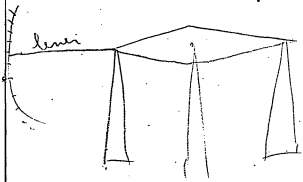
June 21 - 90,

Tried springs of German silver & copper.

The German silver worked well but was not sensitive to small weights while the copper made a good spring

a spring of German silver wire 3" long and having a diameter of 3/4" gave with 20 grms a deflection of 7" but would bear nothing short of 100 grms,

Tried the following arrangement-



In this we do away with all unnecessary friction, and the lever shows from 1 gm to 10 mgs.. (lever 13" long) force of course being constant.

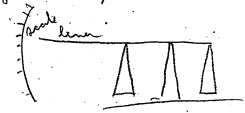
Thomas P. Lamont

June 22 '01

Tried electric magnet to damp oscillations of scale beam, using a strip of copper as before, but could notice no effect.

Thomas P. Garrard

June 23 /40



Experiment repeated with above balance.

Length of beam from balance = 17"

on the scale 1 gm gives a deflection of 5" – from which 10 mgs should give $\frac{1}{20}$"

By test 10 mgs does just this and hence the balance is sensitive even to 5 mgs

This is true up to a load of 40 to 50 gms but for 80 - 100

June 20 / 85 cont.

gives the deflection for a given difference is ~~quite~~ smaller

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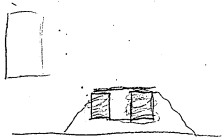
when loaded with 4 25- light-plates in each frame, 1 gram. gives a deflection of $2\frac{2}{4}''$

J. P. Bonardi



wt. air 11.6586
" H_2O 10.2550
" $2H_2O$ 10.5503-

$10ZnSO_4 + 10H_2O$ | add a

$10H_2O + current = 20H + 10^{+}O$

$10ZnSO_4 + 20H = 10Zn + 10H_2SO_4$

$10Zn + 10O = 10ZnO$

$10ZnO + 10H_2SO_4 = 10ZnSO_4 + 10H_2O$

$10ZnSO_4 + 15H_2O$ | add b

$15H_2O + current = 30H + 15O$

$10ZnSO_4 + 30H = 10Zn + 10H_2SO_4 + 10H$

$15Zn + 15O = 15ZnO$

$15ZnO + 10H_2SO_4 = 10ZnSO_4 + 10H_2O + 5ZnO$

$5ZnO + 10H = 5Zn + 5H_2O$

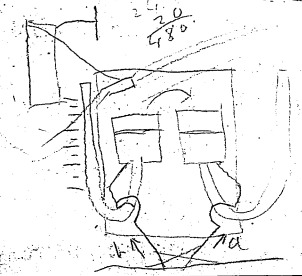
$15ZnSO_4 + 10H_2O$ | add c

$10H_2O + c = 20H + 10O$

$15ZnSO_4 + 20H = 10Zn + 10H_2SO_4 + 5ZnSO_4$

$10O + 10Zn = 10ZnO$

$10ZnO + 10H_2SO_4 = 10ZnSO_4 + 10H_2O$

with 1s of H_2O more oxide is formed on positive plate than can be taken up by H_2SO_4 formed

with 1s of $ZnSO_4$ the action seems to be all right